

Date: March 16, 2000

CONTROLLING WIRELESS PERIPHERALS
FOR PROCESSOR-BASED SYSTEMS

This application is a continuation-in-part of U.S. patent application Serial No. 09/405,575 filed September 27, 1999.

Background

5 This invention relates generally to processor-based systems and particularly to wireless peripheral devices for use in controlling such systems.

Wireless keyboards, wireless mice and wireless remote control units may provide input signals to a processor-
10 based system. For example, wireless keyboards and wireless mice may be utilized to control conventional desktop computer systems. Similarly, remote control units may be utilized to control processor-based systems such as set-top boxes which operate in conjunction with a conventional
15 television receiver. Wireless peripherals may be advantageous because they do not tether the user to the processor-based system. In some cases, the user may operate the processor-based system from a considerable distance.

20 Conventionally, wireless peripheral devices have a dedicated function. Thus, the user who desires to control a processor-based system using wireless technology may have

a separate mouse and a separate keyboard for that system. In the case of a set-top box, the user may have a wireless mouse, a wireless keyboard and a wireless remote control unit for controlling television and computer functions.

5 Thus, there is a continuing need for better ways to use wireless peripherals for controlling processor-based systems.

Brief Description of the Drawings

10 Fig. 1 is a perspective view of one embodiment of the present invention in a first orientation;

 Fig. 2 is a bottom plan view of the embodiment shown in Fig. 1 in a different orientation;

 Fig. 3 is a top plan view of the embodiment of Fig. 1 in still another orientation; and

15 Fig. 4 is a schematic depiction for one embodiment of the invention.

Detailed Description

20 A wireless peripheral device 10, shown in Figure 1, for use with a processor-based system (not shown in Figure 1) includes at least one keyboard 12 having keys which may be utilized to generate input commands for a processor-based system. The wireless peripheral device 10 may include a first wireless interface 16 and a second wireless interface 18.

In one embodiment of the present invention, a single keyboard, such as the keyboard 12, may be provided.

Operation of the same key may result in the generation of a different command through each interface 16 and 18. In one
5 embodiment of the present invention, each of the interfaces 16 and 18 points more directly at the processor-based system when the device 10 is in an orientation dedicated to a function implemented by a particular interface 16 or 18.

That is, depending on the orientation of the device
10 10, one of the interfaces 16 or 18 is pointed at a receiver on a processor-based system and the other of the interfaces is pointed away from the receiver. If the power of the interface is not too great, the signal from the interface pointed directly at the receiver will be recognized by the
15 receiver and the signal from the other interface will be ignored.

The interfaces 16 and 18 advantageously develop signals which are at least 45 degrees apart to avoid simultaneous reception of both signals by the same
20 receiver. Advantageously, the interfaces 16 and 18 are angularly separated by approximately 90 degrees or more.

In other embodiments of the present invention, two separate keyboards may be provided, for example, on opposite sides of the device 10. Thus, in one embodiment
25 of the present invention, a keyboard 12 may be provided on one side and a keyboard 14 may be provided on the other

side. The keyboard 14 may operate the interface 18 and the keyboard 12 may operate the interface 16.

In one embodiment of the present invention, the device 10 implements the functions of a remote control unit and a
5 keyboard. However, it may also be possible to provide a mouse functionality as well. For example, any combination of a remote control unit, keyboard or mouse functionality may be incorporated on two sides of the device.

Alternatively, a third interface may be provided on a
10 separate surface of the device 10. In such case, in one orientation the device acts as a mouse, in another orientation the device acts as a keyboard and in still another orientation the device may act as a remote control unit.

15 A different set of keys 20 may be provided, in one embodiment of the present invention, to implement each desired functionality. Thus, with the device 10 positioned upside down as shown in Figure 2, the keyboard 14 may be exposed and the interface 18 may be directed towards the
20 controlled processor-based receiver 27. In one embodiment of the present invention, a reduced sized keyboard 14, such as a qwerty keyboard, may be utilized to provide a compact arrangement. Other known reduced format keyboards may be utilized as well. Thus, with the device 10 in the
25 orientation shown in Figure 2, keyboard commands, indicated

by the signal A, are issued through the interface 18 to the processor-based receiver 27.

At the same time commands inadvertently entered on the keyboard 12 are developed by the interface 16. However, 5 since the interface 16 is angled away from the receiver 27, they are not received at the receiver 27. Thus, with the keys 20 oriented properly relative to the user, the interface 18 is automatically aligned to control the receiver 27. Conversely, the interface 16, controlled by 10 the keyboard 12 is misaligned relative to the receiver 27.

In the orientation shown in Figure 3, the keyboard 12 is upwardly pointing and the interface 16 is directed toward the processor-based receiver 27. As a result, the signal B issued by the device 10 is detected by the 15 processor-based receiver 27 and is utilized as an input command.

The signal provided by the interface 18 is directed transversely relative to the receiver 27 when the keyboard 12 is oriented properly relative to the user. In such 20 case, the signal from the interface 18 does not control the receiver 27.

The keyboard 12 implementing a remote control unit in one embodiment may include a plurality of numerical keys 26, arrow buttons 22 for moving an on-screen cursor and a 25 selection button 24 situated in between the arrow buttons 22. Other buttons may be provided as well.

Thus, the user can reorient a single device and can thereby automatically obtain two or more functionalities from the same device 10. In some cases, two keyboards may be provided on opposed sides but in other cases, a single
5 keyboard may provide different functionalities depending on its orientation.

Thus, referring to Figure 4, a processor-based system 27 may include a processor 28 coupled to an interface 30. The interface 30, for example, may be a chipset or a
10 bridge. The interface 30 may couple to a bus 38, a system memory 32, and a display controller 34. A display controller 34 may in turn be coupled to a display 36 which may be a television receiver.

The bus 38 may be coupled to a serial input/output
15 (SIO) device 48, a storage device 40 which stores software 68 and a basic input/output system (BIOS) 42. The SIO 48 may be coupled to an interface 47 which receives input signals from the interfaces 16 and 18 of the wireless peripheral device 10. Only one interface 16 or 18
20 communicates with the interface 47 depending on the orientation of the device 10.

The device 10 may have two keyboards 12 and 14 coupled through a processor-based controller 41 in one embodiment of the invention. The controller 41 communicates with the
25 wireless interfaces 16 and 18.

